WASHINGTON STATE DEPARTMENT OF ECOLOGY

January 2013

CONDITIONAL USE LEVEL DESIGNATION FOR BASIC (TSS) TREATMENT – MODELS WITH STORMFILTER CARTRIDGES
&
CONDITIONAL USE LEVEL DESIGNATION FOR BASIC (TSS) TREATMENT – MODELS WITHOUT STORMFILTER CARTRIDGES
&
PILOT USE LEVEL DESIGNATION FOR ENHANCED (METALS) AND OIL TREATMENT – ALL MODELS

For

CONTECH Engineered Solutions UrbanGreen™ BioFilter

Ecology's Decision:

Based on CONTECH Engineered Solutions application submissions, Ecology hereby issues the following use level designations for the UrbanGreen™ BioFilter (BioFilter):

1. **A Conditional Use Level Designation (CULD) for Basic Treatment (total suspended solids).**
   - **Models with the Stormwater Management StormFilter cartridges .**
   - **Design StormFilter cartridges according to a current Ecology Use Level Designation. (For example, engineers shall design the StormFilter with ZPG™ media at a hydraulic loading rate of 1 gpm/ft^2).**
   - **Design the BioFilter component for a rate no greater than 100 in/hr. Design the media depth between 18 inches and 24 inches. Each component has an independent orifice control that regulates the flow rate through the system.**
   - **If the design hydraulic loading rate of the StormFilter cartridges installed along with the BioFilter is sufficient to treat the required water quality storm, the combined system may be considered as equivalent to the highest treatment level obtained by the StormFilter system.**
2. **A Conditional Use Level Designation (CULD) for Basic Treatment (total suspended solids).**
   - **Models without StormFilter cartridges.**
   - **Design the BioFilter component for a rate no greater than 100 in/hr. Design the media depth between 18 inches and 24 inches. The BioFilter contains an independent orifice control that regulates the flow rate through the system.**

3. **A Pilot Use Level Designation (PULD) for Enhanced (dissolved Copper and Zinc) and Oil Treatment.**
   - **Models without StormFilter cartridges.**
   - **Design the BioFilter component for a rate no greater than 100 in/hr. Design the media depth between 18 inches and 24 inches. Each component has an independent orifice control that regulates the flow rate through the system.**

4. **Ecology approves the BioFilter for treatment at the hydraulic loading rates identified above, and sized based on the water quality design flow rate. Calculate the water quality design flow rate using the following procedures:**

   - **Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.**

   - **Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.**

   - **Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.**

5. **These Use Level Designations expire on March 15, 2014 unless extended by Ecology, and are subject to the conditions specified below.**

<u>Ecology's Conditions of Use:</u>

The UrbanGreen BioFilter (BioFilter) shall comply with these conditions:

1. **Design, assemble, install, operate, and maintain the BioFilter units in accordance with CONTECH Engineered Solutions applicable manuals and documents and the Ecology Decision.**

2. **Engineers can design the BioFilter with StormFilter cartridges as a flow-based system with an off-line water quality flow rate. You can design the BioFilter with or without StormFilter cartridges with volume-based design method as proposed in "Modeling the UrbanGreen BioFilter with WWHM."**

3. **CONTECH Engineered Solutions commits to submitting a QAPP for Ecology approval by April 15, 2013 that meets the TAPE requirements for attaining a GULD for Basic, Enhanced, and Oil Treatment. Ecology must review and approve additional QAPPs for each PULD field site in Washington State. Choose sites to reflect the product's treatment intent.**

4. **CONTECH Engineered Solutions shall complete all required testing and submit a TER for Ecology review by April 15, 2014.**

5. **The UrbanGreen BioFilter and StormFilter are separate components that you can combine to treat the water quality design flow rate. As such, the lowest Use Level Designation applies to the performance goal of the entire system.**

6. **Local jurisdictions must file a "Pilot Level Technologies Notice of Intent" form with the Department of Ecology prior to authorizing the BioFilter for a pilot use level application.**

7. **CONTECH Engineered Solutions may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.**

8. **Discharges from the BioFilter shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant: CONTECH Engineered Solutions

Applicant's Address: 11835 NE Glenn Widing Drive
Portland, OR, 97220

Application Documents:

- UrbanGreen™ BioFilter Submittal to Washington Department of Ecology (February 2011). Prepared by CONTECH Engineered Solutions. Received February 18, 2011.

Applicant's Use Level Request:

Conditional Use Level Designation as a Basic, Enhanced, Oil, and Phosphorus treatment device in accordance with Ecology's 2011 *Technical Guidance Manual for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE).*

Applicant's Performance Claims:

- Contech expects the BioFilter to meet the Ecology standards for basic, enhanced, and oil treatment.
- The BioFilter achieved Sil-Co-Sil 106 removal efficiency in excess of 90% for most combinations of variables tested including a biofilter media depth of 24 inches, an infiltration rate of 100 inches per hour and influent concentrations of 100 and 200 mg/L.

Ecology's Recommendations:

- Ecology provides CONTECH Engineered Solutions the opportunity to demonstrate, through additional laboratory and field testing, whether the BioFilter system can attain Ecology's Basic, Enhanced, and Oil Treatment goals.

Findings of Fact:

- Ecology previously granted a GULD for Basic Treatment to the StormFilter treatment system using ZPG™ media at a flow rate of 1 gpm/ft^2. Used in conjunction with the proposed BioFilter system, at the maximum treatment flow rate, the ZPG™ media cartridges would be treating between 23 and 45 percent of the total flow.

- Based on laboratory testing conducted by CONTECH of a scaled down unit (18-inch diameter column), at a flowrate of approximately 100 in/hr, the 4P bio-media (24 inch depth) used in the BioFilter system removed 93 and 92 percent of Sil-Co-Sil 106 at influent concentrations of 97 and 190 mg/L, respectively.

- Based on laboratory testing conducted by CONTECH of a scaled down unit (18-inch diameter column), at a flowrate of approximately 100 in/hr, the 4P bio-media (18-inch depth) used in the BioFilter system removed 90 percent of Sil-Co-Sil 106 at influent concentrations of 92 mg/L.

- Based on laboratory testing conducted by CONTECH of a scaled down unit (18-inch diameter column), at a flowrate of approximately 100 in/hr, the 4P bio-media (12-inch depth) used in the BioFilter system removed 89 percent of Sil-Co-Sil 106 at influent concentrations of 95 mg/L.

- Based on laboratory testing conducted by CONTECH of a scaled down unit (18-inch diameter column), at a flowrate of approximately 100 in/hr and an influent Sil-Co-Sil 106 concentration of 20.5 mg/L, the 4P bio-media (24 inch depth) effluent ranged from 2.1 to 10.4 mg/L.

- Based on laboratory testing conducted by CONTECH of a scaled down unit (18-inch diameter column), the 4P bio-media (24 inch depth) removed 93 percent of Sil-Co-Sil 106 at higher flowrates (two runs, one at 153 in/hr and one at 201 in/hr).

- Rudimentary field infiltration tests conducted on two field-installed units showed that the 4P media infiltration rate remained above 100 in/hr up to a year after installation of the units (125-311 in/hr for one unit; 258-330 in/hr for the other).

- A full-scale unit (9 ft. x 7 ft. vault) was subjected to an influent flow of 2.0 cfs to assess successful hydraulic operation and bypass.

- A bed filter comprised of CSF® leaf media (one component of UrbanGreen 4PS BioMedia) at a depth of 18 inches and a hydraulic loading rate of 2.25 gpm/ft^2 (equivalent to an infiltration rate of 217 in/hr) achieved 92% TSS, 45% Total Phosphorus, 65% Total Copper, 83% Total Zinc and 84% Petroleum Hydrocarbon removal in 17 storms collected over three years at a site in Portland, Oregon.

Other UrbanGreen BioFilter Matters to be Addressed By the Applicant:

1. Laboratory test results are available, yet it is unknown whether the UrbanGreen™ BioFilter system can reliably attain 80% removal of the finer particles comprising TSS found on local highways, parking lots, and other high-use areas at the design operating rate. CONTECH Engineered Solutions, should test a variety of operating rates to establish conservative design rates. Pollutant loading capacities of and breakthrough data on the filter media should also be determined to help estimate typical maintenance cycles.

2. Further testing is required to establish the ability of the BioFilter system to provide removal of dissolved Cu, dissolved Zn, or oil found on local highways, parking lots, and other high-use areas at the design operating rate. CONTECH Engineered Solutions should test a variety of operating rates to establish conservative design rates.

3. Test the system under normal operating conditions, such that pollutants partially fill the unit. Results obtained for "clean" systems may not be representative of typical performance.

4. Conduct field testing at sites that are indicative of the treatment goals.

5. Conduct testing to obtain information about maintenance requirements in order to determine a typical maintenance cycle.

6. Conduct testing to determine if oils and grease affect the treatment ability of the filter media. This should include a determination of how oil and grease may affect the ion-exchange capacity of the system if claims are to be made for metals or phosphorus removal.

7. Conduct loading tests on the 4P media to determine maximum treatment life of the system.

8. If anyone seeks treatment credit for a system containing both the BioFilter and StormFilter components at a level higher than the lowest Ecology Use Level Designation for either component, field-testing must provide water quality data that assess conditions when both the BioFilter and StormFilter cartridges are treating runoff. For example, since the StormFilter with ZPG media is currently only approved for Basic treatment at 1 gpm/ft^2, the entire system would only be allowed for Basic Treatment even if the BioFilter component has a Use Level Designation for an alternative performance goal such as Enhanced Treatment. The flow rate at which the BioFilter capacity is exceeded and parallel treatment begins in the cartridges must be monitored.

9. CONTECH should verify that the media surface area in the corner of the "-NC" units is sufficiently hydraulically connected and is contributing to treatment.

10. CONTECH should assess pumice floating and soil component separation in the field-testing of the BioFilter component to determine if there is any effect on pollutant removal.

Technology Description: Download at:
http://www.conteches.com/Products/Stormwater-Management/Treatment/UrbanGreen-BioFilter.aspx

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Revision History

Date	Revision
July 2011	Original Draft use-level-designation document
January 2013	Modified Design Storm Description, added Revision Table, revised format, removed specific model numbers, Revised dates for QAPP and TER submittals, and expiration date